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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/710,628	11/08/2000	Sien G. Kang	18419-008210US	5772

20350 7590 05/22/2003

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EXAMINER

RAO, SHRINIVAS H

ART UNIT PAPER NUMBER

2814

DATE MAILED: 05/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/710,628

Applicant(s)

KANG ET AL.

Examiner

Steven H. Rao

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

Receipt is acknowledged of paper submitted under 37 CFR 1.114 claiming priority from U.S. Patent Application No. 09/710,628 filed on November 08, 2000 which itself claims priority under 35 U.S. Sec. 119 from U.S. Serial No. 9/295,858 filed on April 21, 1999.

Request for Continued Examination Application

The request filed on 9/8/2000 for a Request for Continued Examination Continued (RCE) under 37 CFR 1.114 based on parent Application No. 09/710,528 is acceptable and a RCE has been established. An action on the RCE follows.

Preliminary Amendment Status

Acknowledgment is made of entry of preliminary amendment filed 02 /19 /2003.. Therefore claim 16 as amended by the amendment and claims 1 to 15 and 17 to 22 as previously recited are currently pending in the application.

Specification

Drawings

New corrected drawings are required in this application because to correct the objections to the drawings by the drafts person in the enclosed PTO-948.

Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 19 and 22 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 19 and 22 recite " wherein the substrate is a silicon substrate having (100) crystal orientation."

The specification as originally filed does not describe that the substrate has (100) crystal orientation.

Applicants' respond by citing pages Table 1-3 from Wolf, the citation is not relevant to the current pending claims because they (claims) are not limited to single-crystal silicon wafers but include GaAs, GaN and Quartz (specification page 3 lines 12-15) which is the only description in Table 1-3.

Claim Objections

Claim 21 is objected to for the following informalities.

With respect to claim 21 the recitation " wherein the combination of the deposition species and the etching species are contacting the non-uniform surface in a thermal setting of a temperature of about 1,000 degrees Celcius or greater" may be amended as follows :

" wherein the combination of the deposition species and the etching species are contacting the non-uniform surface placed in a thermal setting of a temperature of about 1,000 degrees Celcius or greater ".

Appropriate correction (in view of Applicants' response) is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 5-6, 7-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Sato et al. (U.S. patent No. 5,869,387 herein after Sato) (reproduced below for ready reference) and for the reasons set out in the response to arguments section below.

With respect to claim 1, Sato describes a method of fabricating substrates including the steps of : providing a substrate comprising a film of material characterized by a non uniform surface with plurality of defects (Sato fig. 1 A # 102, col. 7 lines 65), at least some of the roughness being 100 Angstroms or greater (Sato col. 1 line 65), and an etching species contacting the non-uniform surface in a thermal setting to reduce a level of non-uniformity of the non-uniform surface by filling a portion of the defects to smooth the film of material, the film of material being substantially free from defects and being characterized by a surface roughness of a predetermined value. (col. 4 lines 48-60, col. 9 lines 57 to col. 10 lines 12).

With respect to claim 2, wherein the substrate is heated to 1000 ° or greater Sato col. 2 line 47- 1260 degrees or greater).

With respect to claims 5 and 6, wherein the particles are hydrogen bearing species derived from hydrogen gas during an implantation process. (Sato example 2 col. 18 lines 20-35).

With respect to claims 7-9, wherein the surface roughness predetermined value is between 2- 0.1 nanometers root mean square. (Sato claim 11, etc.).

With respect to claims 10-11, wherein the etching species, includes a hydrogen, halogen bearing compounds like Chlorine, HCl, HBr, HI and HF. (Embodiment 2, col. 8 lines 56-col. 11 line 39).

With respect to claims 12-13, wherein the etching process comprises a fluorine bearing compound like SF₆, CF₄, NF₃ and CCl₂F₂. (col.9 lines 15-25).

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With respect to claims 14-16 wherein the deposition species comprises a silane bearing gas, silicon bearing species like SiH_4 , SiXCIXH_2 and SiCIX . (Sato Example 8 col. 20 lines 1-2).

With respect to claim 17, wherein the non uniform surface is cleaved by Smart Cut or an ELTRAN process (Sato col. 4 line 62).

With respect to claim 18, wherein the defects are called HIF defects.

It is noted for the records that while an applicant may his/her own lexicographer, patentability of claims is determined by whether similar structures/methods are described by the prior art and not what they the structure/method are called.

As stated above, Sato describes similar defects for same purpose therefore irrespective of applicants' nomenclature, the prior art discloses similar defects therefore the defects are obvious in view of Sato.

With respect to claim 19, assuming arguendo that no new matter rejection exists, wherein the substrate is a silicon substrate having (100) crystal orientation. (Sato page 2 citing Journal of Applied Physics 1 June 1990).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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A. Claims 3-4, are rejected under 35 U.S.C. 103(a) as being unpatentable over Sat et al. (U.S. Patent No. 5,869,387, herein after Sato) previously applied and Wolf, Silicon processing for the VLSI Era, Vol. 1, pages 57-58.

With respect to claims 3 and 4, wherein the temperature increase is 10 or 20 degrees per second or greater.

Sato does not specifically describe the temperature increase is 10 or 20 degrees per second or greater.

However Wolf vol. 1 pages 57-58 describes the temperature increase is 10 or 20 degrees per second or greater to evenly heat the substrate and avoid causing slip or war page.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Wolf's teaching of the temperature increase is 10 or 20 degrees per second or greater in Sato's method to evenly heat the substrate and avoid causing slip or war page. (Wolf Vol. I pages 57-58).

B. Claims 20-22, are rejected under 35 U.S.C. 103(a) as being unpatentable over Sat et al. (U.S. Patent No. 5,869,387, herein after Sato) previously applied.

With respect to claim 20, wherein the method of fabricating the substrate includes the steps of : providing a substrate comprising a film of material with a non-uniform surface, the non-uniform surface including a plurality of defects, at least some of the defects being 100 Angstroms or greater (Sato fig. 1A # 102, col. 7 lines 65 and col. 2lines 9-11) and applying simultaneously to the non-uniform surface a combination of a silicon-containing deposition species for deposition of a deposition material in order

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to smooth the surface, assuming arguendo that no new matter rejection exists, (Sato col.9 lines 5-55, col. 10 lines 59 to col. 11 line 5 and col.7 line 64 to col. 8 line 21) it is noted current case is :

The performance of two steps simultaneously, which have previously been performed in sequence was held to have been obvious. In re Tantincloux, 108 USPQ 125 (CCPA 1955), further, " As a matter of fact selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results. In re Burhaus, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

With respect to claim 21, wherein the combination of the deposition species and etching species are contacting the non-uniform surface in a thermal setting of a temperature of about 1,000 degrees Celcius or greater assuming arguendo that no new matter rejection exists, Sat col. 2 lines 47, claim 23, etc.).

With respect to claim 22, assuming arguendo that no new matter rejection exists, wherein the fabricating method includes the steps of : providing a silicon substrate comprising a film of material with a non-uniform surface, the non-uniform surface including a plurality of defects, at least some of the defects being 100 Angstroms or greater (Sato fig. 1A # 102, col. 7 lines 65 and col. 2lines 9-11), the silicon substrate having (100) crystal orientation, the non-uniform surface including particles derived from hydrogen gas during an implantation process (Sato page 2 citing Journal of Applied Physics 1 June 1990 and claim 1 etc.) and applying simultaneously to the non-uniform surface a combination of a silicon-containing deposition species for deposition of a deposition material and a Halogen –containing-etching species for etching an etch able

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material in order to smooth and reduce a level of non-uniformity of the non-uniform surface, the halogen –containing etching species including HCl (Sato col.9 lines 5-55, col. 10 lines 59 to col. 11 line 5 and col.7 line 64 to col. 8 line 21).

Response to Arguments

Applicant's arguments filed on 02/18/2003 have been fully considered but they are not persuasive for the following reasons :

Applicants' first contention is that Sato provides no motivation to apply a " combination" of these steps " to reduce a level of non-uniformity of the non-uniform surface by filling a portion of the defects to smooth the film of material is not persuasive because Sato in col. 10 lines 6-12 states :

in the present invention, after the thin monocrystal layer is formed on the porous layer, the substrate having the thin monocrystal layer formed thereon is heat-treated in a reducing atmosphere to flatten the surface of the thin monocrystalline Si layer as shown in FIG. 2B and FIG. 4B. The conditions of the heat treatment are the same as in Embodiment 1.

Further col. 6 lines 30-31 :

thereon in a reducing atmosphere to flatten and smooth the surface of the monocrystal

col. 7 lines 20-22 :

practiced in addition to other processes. According to this invention, the roughness in a local monocrystal region on a surface of a substrate which cannot otherwise be flattened by polishing, can be flattened.

Therefore Applicants' contention is not persuasive.

Further as seen above Sato employs deposition process to smooth a non-uniform layer.

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Applicants' next contention that Sato does not teach either the deposition or etching steps reduce the level of non-uniformity of a non-uniform surface is not persuasive for reasons stated above.

Applicants' content that dependent claims 2-13 and 19 are allowable because they depend upon allegedly allowable claim 1.

However as seen above claim 1 is not allowable and therefore claims 2-13 and 19 are also not allowable.

Claims 20-22 were alleged to be allowable based on similar arguments .

However as seen above those arguments were not persuasive and therefore claims 20-22 are also not allowable.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Steven H. Rao whose telephone number is (703) 3065945. The examiner can normally be reached on Monday- Friday from approximately 7:00 a.m. to 4:30 p.m.

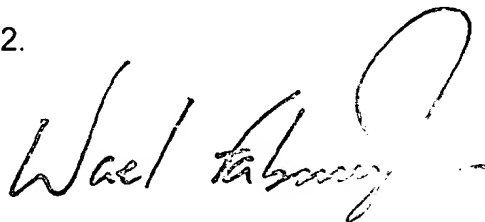
Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. The Group facsimile number is (703) 308-7722.



Steven H. Rao

Patent Examiner

May 07, 2003.



SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800